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ART UNIT	PAPER NUMBER
2634	

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12

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Please find below and/or attached an Office communication concerning this application or proceeding.

ATTORNEY: TF

ACTION: RPT2CL DUE: 30 Jan 04
ACTION: R-OA DUE: 21 Mar 04
ACTION: D-OA DUE: 21 Apr 04
DOCKETED BY: MC DATE: 2 Feb 04

Office Action Summary	Application No.	Applicant(s)	
	09/510,550	BARLEV ET AL.	
	Examiner	Art Unit	
	Betsy L. Deppe	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-147* is/are pending in the application.

4a) Of the above claim(s) *54-56, 108-110, 131-134 and 139-142* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-51, 53, 57-105, 107, 111-130, 135-138 and 143-147* is/are rejected.

7)☒ Claim(s) *52 and 106* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 February 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4 and 9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1-53, 57-107, 111-130, 135-138 and 143-147 in Paper No. 12 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)) and claims 54-56, 108-110, 131-134, and 139-142 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention. The applicant is reminded to cancel the non-elected claims.

Drawings

2. The drawings are objected to because in Figures 5 and 6, "REVEIVE" should be "RECEIVE" and in Figure 6, "TEST MODULE 256" should be "POWER SWITCH MODULE 256" in order to be consistent with page 27, lines 14, 19 and 27. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the specification.

4. The disclosure is objected to because of the following informalities: on page 27, line 23, "255" should be "256" (see page 27, lines 14 and 19); on page 60, line 15, it appears that "?" should be ">". Appropriate correction is required.

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: description of the encoder recited in claim 46 and 100.

Claim Objections

6. The claims are objected to because of the following informalities:

in claim 1, line 15, "said data stream" should be "said ***received high speed*** data stream" (see claim 1, line 14);

in claim 1, line 16, "the original" should be "***an*** original";

in claim 31, line 2, "the cable" should be "***a*** cable";

in claim 36, line 2, "with" should be "into" (see page 22, lines 31-33);

in claim 37, lines 1-2, "demultiplexing a plurality of lower rate telephony lines from said high speed data stream" should be "demultiplexing said high speed data stream into a plurality of lower rate telephony lines" for clarification;

in claims 50 and 51, "K" is not defined;

in claim 51, lines 1 and 2, "the" should be deleted;

in claim 52, line 9, "said means for selecting" should be inserted before "comprising" for clarification;

in claim 58, line 13, "the original" should be "***an*** original";

in claim 64, "the local" should be "***a*** local";

in claim 106, line 15, "the" should be "an";

in claim 118, lines 6 and 8 and claims 121-126, lines 1-2, "bit rate" should be "***data*** rate" (see page 48, line 29 and Figure 13, step 452);

in claim 118, line 7, it appears that "maximum rate" should be "maximum ***data*** rate";

in claim 118, lines 7 and 9; claim 120, line 2; and claim 125, line 3, the Examiner suggests changing "link" to "channel" in order to be consistent with claim 118, line 2;

in claim 121, line 2, "the Near End" should be "***a*** Near End";

in claim 121, line 3, "said twisted pairs" should be "said ***plurality of*** twisted ***pair lines***" in order to be consistent with claim 118, line 2-3;

in claims 121-126, line 2, the Examiner suggests changing "said modem elements" to "***each*** modem ***element***" for improved readability;

in claim 123, line 2, "the" should be "a";

in claim 124, line 2, "the" should be "an";

in claim 125, line 2, "the" should be "a";

in claim 126, line 3, the Examiner suggests changing "links" to "channels" in order to be consistent with claim 118, line 2;

in claim 127, lines 3 and 5, "bit rate" should be "***data*** rate" (see page 48, line 29 and Figure 13, step 452);

in claim 127, line 4, it appears that "maximum rate" should be "maximum ***data*** rate";

in claim 127, lines 4 and 6 and claim 129, line 2, "link" should be "channel" in order to provide sufficient antecedent basis for "said channel" in claim 129, line 3;

in claim 129, "link" on line 2 should be "line" in order be consistent with the terminology in claim 58 and "said modem elements" on lines 2-3 should be "***each*** modem ***element***" for improved readability; and

in claim 135, line 1, "the" should be deleted

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 38-41, 46, 94, 95, 100, 122, and 147 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to

enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

10. With regard to claims 38-41, 94 and 95, the detailed description does appear to describe multiplexing/demultiplexing a plurality of low frequency telephony lines with/from a high-speed data stream using frequency division multiplexing, as recited in claims 38, 40, 94 and 95, respectively. According to the detailed description corresponding to Figure 7, frequency division multiplexing by a splitter (248) is applied the plurality of low speed data output by the modem module (243). (See page 27, lines 4-13) Therefore, it is unclear how to apply frequency division multiplexing to a high-speed data stream and a plurality of low frequency lines as recited in claims 38 and 40.

11. With regard to claims 46 and 100, the detailed description does not appear to describe the claimed encoder. It is unclear how the encoder adjusts the encoding scheme to provide the second bit error rate in the event of line failures.

12. With regard to claim 122, it is unclear how the allocation of pairs relates to a step of calculating the optimal bit rate of a modem.

13. With regard to claim 147, the detailed description does appear to describe a means for utilizing feedback information as recited in claim 147, lines 1-4.

14. Claims 24-26, 34, 36-41, 45, 81-83, 90, 114, 118-129, 135-138 and 143-146 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

15. The term "more" in claims 24 and 81 is a relative term which renders the claim indefinite. The term "more" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear what is considered to be "more sensitive data streams" and "more spatial centrally located pairs".

16. The terms "more" and "closer" in claims 25 and 82 are relative terms which render the claim indefinite. The terms "more" and "closer" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear what is considered to be "more robust data streams." Furthermore, it is unclear how close a twisted pair must be to the boundary of a binder in order to read on the limitation of "situated ***closer*** to the boundary of the binder."

17. The term "more centrally situated pairs" in claims 26 and 83 is a relative term which renders the claim indefinite. The term "more centrally situated pairs" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear how far a twisted pair can be from the center of the boundary of the binder in order to still read on the limitation of "more centrally situated."

18. Claims 34 and 90 are vague and indefinite because line 2 refers to "separate high speed data streams" whereas claims 1 and 58, respectively, refer only to a single high-speed data stream.

19. With regard to claims 36-41, it is unclear whether "said high speed data stream" in line 2 of claims 36-38 and 40 is referring to the "high speed data stream" in claim 1, lines 3-4, the "encoded high speed data stream" in claim 1, line 9 or the "received high speed data stream" in claim 1, line 14. Furthermore, it is unclear how either the means for multiplexing or the means for demultiplexing interfaces with the limitations recited in claim 1. For example, is the means for multiplexing in claim 36 coupled to the input or output of the encoder?

20. The term "more" in claims 45, 99 and 135 is a relative term which renders the claim indefinite. The term "more" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear what is meant by "more isolated" and "more sensitive" on the last lines of the respective claims.

21. With regard to claims 114, 117 and 122, the terms "more" and "less" are relative terms which render the claim indefinite. The terms "more" and "less" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For example, it is unclear what constitutes "more sensitive data" or "less sensitive data" in order to read on the respective claims. Furthermore, it is

unclear what is considered to be "more spatial central pairs" and "less spatial central pairs" in order to read on the respective claims.

22. With regard to claim 118-126, claim 118 recites the limitation "the data rates" in line 9. There is insufficient antecedent basis for this limitation in the claim. Assuming that "bit rate" in claim 118, lines 6 and 8 should be "data rate" and that "maximum rate" in claim 118, line 7 should be "maximum data rate," it is unclear whether "the data rates" in claims 118, line 9; claim 119, line 2; and claim 120, line 2 is referring to one or all of the rates recited in claim 118, lines 6, 7 and 8, respectively.

23. Claims 121-126 recite the limitation "said step of calculating the optimal bit rates" in line 1 of the respective claims. There is insufficient antecedent basis for this limitation in the respective claims. Claim 118 does not recite a step of calculating the optimal bit rates.

24. With regard to claims 127-129, assuming that "bit rate" in claim 127, lines 6 and 8 should be "data rate" and that "maximum rate" on line 7 should be "maximum data rate," it is unclear whether "the data rates" in claim 127, line 6 is referring to one or all of the rates recited in claim 127, lines 6, 7 and 8, respectively. Furthermore, it is unclear how different data rates recited in claim 127 relate to "the data rate" in claim 58, line 9.

25. In claim 128, it is unclear how the data dispatcher and Forward Error Correction tables interface with the steps recited in claim 58 and 127.

26. With regard to claims 143-146, the term "more" in claim 143, line 10, is a relative term which renders the claim indefinite. The term "more" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one

of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear what is meant by "more broadband" and "more isolated" on the last line of the claims.

Claim Rejections - 35 USC § 102

27. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

28. Claims 58, 64-69, 71-75, 77, 91, 115 and 116 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Locklear, Jr. et al. (US Patent No. 5,999,565).

29. With regard to claims 58, 64 and 71, Locklear, Jr. discloses the claimed invention including providing a plurality of modem elements, dividing a high speed data stream into a plurality of low rate data streams, transmitting said plurality of low rate data streams via the plurality of modems, adapting the data rate of each modem in accordance with the quality of an associated twisted pair line, receiving a plurality of low rate data streams and assembling the received plurality of low rate data streams and an implicit service module for interfacing between a telephone service and the high speed

data stream. (See Figures 1 and 3; column 3, line 24 - column 4, line 26; column 7, line 21 – column 8, line 65)

30. With regard to claims 65-69, Locklear, Jr. et al. discloses the claimed invention including the recited variety of digital subscriber line or high bandwidth technology for the modem elements. (See column 3, lines 53-65)

31. With regard to claims 72-75 and 77, Locklear, Jr. et al. disclosed the claimed invention including an interface to one of the recited services. (See column 4, lines 9-18 and 24-26)

32. With regard to claim 91, Locklear, Jr. et al. discloses the claimed invention including transmitting the high speed data stream simultaneously with existing lower rate telephony signals. (See column 4, lines 16-18)

33. With regard to claims 94 and 95, assuming that claims 94 and 95 should be consistent with Figure 7 and the corresponding description, Locklear Jr. et al. discloses the claimed invention including means for multiplexing telephone lines with high speed data using frequency division multiplexing. (See column 4, lines 9-19)

34. Claim 130 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by Chen (US Patent No. 5,970,088 cited in the IDS filed June 27, 2000, Paper No. 4). (See Figures 14a-14e and column 40, line 65 – column 42, line 16)

Claim Rejections - 35 USC § 103

35. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

36. Claims 1-7, 14, 47-51, 112, and 113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Betts (US Patent No. 4,734,920) in view of Helms et al. (US Patent No. 6,144,695).

37. With regard to claims 1, 7, 47 and 48, Betts discloses the claimed invention including a plurality of modem elements, a dispatcher, and a collector. (See column 1, lines 25-35) However, Betts does not teach an encoder and decoder for applying an error correction encoding scheme to the high speed data stream.

Figures 2A, 2B and 3 of Helms et al. disclose an encoder for applying error correct0ion to a high speed data stream and a corresponding decoder for applying an error correction decoding scheme wherein Reed-Solomon error correction coding is used. (See column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement an encoder in the device disclosed by Betts in order to ensure accurate recovery of the transmitted data by reducing the error rate.

38. With regards to claims 2-6, Betts in view of Helms et al. discloses the claimed invention including an interleaver, de-interleaver, scrambler or de-scrambler. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and column 2, line 64 –

column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements in the device disclosed by Betts in order to provide a more secure transmission.

39. With regard to claim 14, since Betts discloses that a DTE provides the high-speed data, it is implicit that there is an interface or service channel module between the DTE and the high-speed data stream. Therefore, Betts in view of Helms et al. discloses the claimed invention.

40. With regard to claim 49, Betts in view of Helms et al. discloses the claimed invention including an encoder that generates a plurality of codewords of length K wherein each codeword consists of a payload portion containing K-R bytes and a redundancy portion consisting of R bytes. Betts in view of Helms et al. discloses using forward error correction (FEC) coding such as Reed-Solomon coding and it is well-known in the art that FEC or Reed-Solomon coding generates codewords of length K wherein the codeword consists of a payload portion containing K-R bytes and a redundancy portion consisting of R bytes.

41. With regard to claim 50, Betts in view of Helms et al. discloses the claimed invention including an encoder which generates codewords wherein each codeword consists of a payload portion containing K-R bytes and a redundancy portion consisting of R bytes. Although Betts in view of Helms et al. does not disclose the basis for how K and R are chosen, it would be an obvious matter of design to choose K and R based on the system in which forward error correction is implemented and the desired amount of error correction.

42. With regard to claim 51, Betts in view of Helms et al. discloses the claimed invention except for the basis for selecting the parameters for the codewords. It would be an obvious matter of design to choose K and R based on the system in which forward error correction is implemented and the desired amount of error correction.

43. Claims 1-7 and 14 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnan et al. (5,809,070) in view of Helms et al.

44. With regard to claims 1 and 7, Krishnan et al. discloses the claimed invention including a plurality of modems, a dispatcher, and a collector. (See Figure 1; abstract, column 1, lines 36-50 and column 2, lines 36-44) However, Krishnan et al. does not teach an encoder and decoder for applying an error correction encoding scheme to the high speed data stream.

Figures 2A, 2B and 3 of Helms et al. disclose an encoder for applying error correction to a high speed data stream and a corresponding decoder for applying an error correction decoding scheme wherein Reed-Solomon error correction coding is used. (See column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement an encoder in the device disclosed by Krishnan et al. in order to ensure accurate recovery of the transmitted data by reducing the error rate.

45. With regards to claims 2-6, Krishnan et al. in view of Helms et al. discloses the claimed invention including an interleaver, de-interleaver, scrambler or de-scrambler. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and column 2, line 64 –

column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements in the device disclosed by Krishnan et al. in order to provide a more secure transmission.

46. With regard to claim 14, Krishnan et al. in view of Helms et al. discloses the claimed invention since it is implicit that there is an interface between the computer and the high speed data stream.

47. Claims 1-20, 35, 38-41, 112 and 113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. in view of Helms et al.

48. With regard to claims 1, 7, and 14, Locklear, Jr. et al. discloses the claimed invention including a plurality of modems, a dispatcher, a collector and an implicit service module for interfacing between a telephone service and the high speed data stream. (See Figures 1 and 3; column 3, line 24 - column 4, line 26; column 7, line 21 – column 8, line 65) However, Locklear, Jr. et al. does not teach an encoder and decoder for applying an error correction encoding scheme to the high speed data stream.

Figures 2A, 2B and 3 of Helms et al. disclose an encoder for applying error correction to a high speed data stream and a corresponding decoder for applying an error correction decoding scheme wherein Reed-Solomon error correction coding is used. (See column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement an encoder in the device disclosed by Locklear, Jr. et al. in order to ensure accurate recovery of the transmitted data by reducing the error rate.

49. With regards to claims 2-6, Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention including an interleaver, de-interleaver, scrambler or de-scrambler. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements in the device disclosed by Krishnan et al. in order to provide a more secure transmission.

50. With regard to claims 8-12, Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention including the recited variety of digital subscriber line or high bandwidth technology for the modem elements. (See column 3, lines 53-65)

51. With regard to claim 13, Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention except specifying using a plurality of Discrete Multitone modem elements. Since it is well-known in the art to use DMT technology to transmit data over telephone lines, it would have been an obvious matter of design choice to use DMT modems based on factors such as the type of application, desired performance, or cost and availability of a particular modem technology.

52. With regard to claims 15-18 and 20, Locklear, Jr. et al. in view of Helms et al. disclose the claimed invention including an interface to one of the recited services. (See Locklear, Jr. et al., column 4, lines 9-18 and 24-26)

53. With regard to claims 19, 20, 112 and 113, Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention except for an interface to one of the recited services. It would have been an obvious matter of design choice to adapt the service channel module to a particular service based on the network in which the device is implemented.

54. With regard to claim 35, Locklear, Jr. et al. in view of Helms et al. disclose the claimed invention including means for transmitting the high speed data stream simultaneously with existing lower rate telephony signals. (See Locklear, Jr. et al. column 4, lines 16-18)

55. With regard to claims 38-41, assuming that claims 38-41 should be consistent with Figure 7 and the corresponding description, Locklear Jr. et al. in view of Helms et al. disclose the claimed invention including means for multiplexing telephone lines with high speed data using frequency division multiplexing. (See Locklear Jr. et al., column 4, lines 9-19)

56. Claims 1-7 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seidel (US Patent No. 4,383,316) in view of Helms et al.

57. With regards to claims 1, 7 and 53, Seidel discloses the claimed invention including a plurality of modem elements, a dispatcher, a collector and a means for generating a spatial frame comprising a header and data words. (See Figures 1 and 3; column 1, lines 40-60; and column 2, lines 18-28) Although Seidel does not explicitly disclose a plurality of modems, it is inherent that there are modems for transmitting the signals over the lower speed data signals over the telephone lines. However, Seidel does not teach an encoder and decoder for applying an error correction encoding scheme to the high speed data stream.

Figures 2A, 2B and 3 of Helms et al. disclose an encoder for applying error correction to a high speed data stream and a corresponding decoder for applying an

error correction decoding scheme wherein Reed-Solomon error correction coding is used. (See column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement an encoder in the device disclosed by Seidel in order to ensure accurate recovery of the transmitted data by reducing the error rate.

58. With regards to claims 2-6, Seidel in view of Helms et al. discloses the claimed invention including an interleaver, de-interleaver, scrambler or de-scrambler. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements in the device disclosed by Seidel in order to provide a more secure transmission.

59. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of McGhee et al. (US Patent No. 6,553,075 B1). The references as applied to claim 1 above disclose the claimed invention except for a test module taking periodic measurements of one or more twisted pair line parameters at various frequencies.

McGhee et al. discloses a device which monitors crosstalk between twisted wire pairs at various frequencies. (See abstract; column 1, line 59 – column 2, line 6; and column 2, lines 22-30) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the device disclosed by McGhee et al. into the system taught by the references as applied to claim 1 in order to adjust the

transmission rate based on the detected crosstalk thereby increasing the efficiency of the data transfer.

60. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 in view of McGhee et al., as applied to claim 21 above, and further in view of Terry (US Patent No. 6,055,297). The references as applied to claim 1 above in view of McGhee et al. discloses the claimed invention except for monitoring near-end crosstalk as the line parameter. Since Terry discloses that near-end crosstalk is also a source of interference for twisted-pair telephone lines (see column 1, lines 31-49), it would have been obvious to one of ordinary skill in the art at the time the invention was made to monitor near-end crosstalk to compensate for known possible sources of noise and interference thereby improving the transmission rate and accuracy of data recovery.

61. Claims 24-26, 31-34 and 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Jones et al. (US Patent No. 5,991,271). The references as applied to claim 1 above disclose the claimed invention except for allocating data streams to twisted pairs within a binder as recited in the respective claims. Jones et al. teaches allocating signals to twisted pairs in binders based on performance criterion or line quality parameters. (See abstract; Figures 2 and 6; column 3, lines 41-51; column 4, line 58 – column 2, line 2; column 6, line 60 – column 7; and column 9, line 60 – column 11, line 8) It would have

been obvious to one of ordinary skill in the art at the time the invention was made to use allocation of data streams as disclosed by Jones et al. in the system disclosed by the references as applied to claim 1 above in order to improve the overall performance of the system. The allocation of data streams to particular twisted pairs within a binder is based on the physical factors that affect performance (such as length of the cable or number of cables within the binder) and on the desired performance. Furthermore, it is implicit that there is a means for spatial mapping the internal structure of a cable and binder unit in order to be able to allocate signals.

62. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 and further in view of Lancon et al. (US Patent No. 6,647,028 B1). The references as applied to claim 1 above disclose the claimed invention except for excluding a particular twisted pair line from the plurality of twisted pair lines used for transmission of the high speed data stream in the event the quality of the particular twisted pair line drops below a threshold.

Lancon et al. teaches discontinuing the use of a transmission line if the quality of the line is unacceptable. (See column 12, lines 13-46) It would have been obvious to one of ordinary skill in the art at the time the invention was made implement the teaching of Lancon et al. into the system disclosed by the references as applied to claim 1 above in order to avoid losing data and improve data reliability.

63. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Walsh et al. (US Patent No. 5,515,398) and Starr (US Pub. No. 2001/0043675 A1). The references as applied to claim 1 above disclose the claimed invention except for test modules at opposite ends of copper pair lines wherein the first test module transmits a plurality of tones at different frequencies and having variable amplitudes and the second test module measures the received power of each received tone and communicates the power measurements to the first test module.

Walsh et al. teaches a technique for analyzing the characteristics of telephone lines wherein a first test module transmits a plurality of tones at different frequencies and having variable amplitudes over a transmission line and the second test module measures the received power of each received tone. (See column 1, lines 5-24) It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Walsh et al. with the system disclosed by the cited references as applied to claim 1 in order to optimize performance by compensating for changes in line quality.

Since Starr teaches teaching transmitting test results over a communications channel (see abstract and paragraph [0025]), it would have been an obvious matter of design choice to one of ordinary skill in the art at the time the invention was made whether to communicate the power measurements based on considerations such as how the measurements are processed and the circuit for processing the power measurements.

64. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of O'Connor et al. (US Patent No. 4,780,883) and Chen. The references as applied to claim 1 above disclose the claimed invention except a crosstalk cancellation means comprising a means for measuring a plurality of cable parameters including near end crosstalk and means for canceling the near end crosstalk.

O'Connor et al. discloses a mechanism for measuring and monitoring line quality (i.e. cable parameters). (See column 1, lines 15-32) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a mechanism for measuring and monitoring line quality in the system taught by the references as applied to claim 1 above in order to maximize the data throughout for a given set of lines and line conditions. (See O'Connor et al., column 1, lines 28-32) Although O'Connor et al. does not disclose measuring near end crosstalk, it would have been obvious to one of ordinary skill in the art at the time the invention was made to also measure near end crosstalk since near end crosstalk affects the quality, and hence, the rate of the data transmission.

Chen discloses canceling near end crosstalk from a received data stream. (See Figures 14a-14e and column 40, line 65 – column 42, line 16) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the teachings O'Connor and Chen in the device disclosed by the references as applied to claim 1 above in order to more reliably transmit and receive data by anticipating

causes of signal degradation and providing compensation or corrections due to these sources of signal degradation.

65. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Chen. The references as applied to claim 1 above disclose the claimed invention except for the recited NEXT cancellation means. Chen discloses the recited NEXT cancellation means. (See Figures 14a-14e and column 40, line 65 – column 42, line 16) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the NEXT cancellation means disclosed by Chen into the system taught by the references as applied to claim 1 above in order to avoid data degradation and enable accurate data recovery.

66. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Terry. The references as applied to claim 1 above discloses the claimed invention including transmitting high-speed data streams with telephone signals over copper pair lines. Since Terry teaches that telephone lines are used to carry high speed signals in addition to telephone signals (see column 1, lines 32-34), it is inherent that the plurality of data channels/transmission lines in the references as applied to claim 1 above comprises means for transmitting a high speed data stream with existing lower rate telephony signals.

67. Claims 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Liberman et al. (US Patent No. 3,655,915). The references as applied to claim 1 above discloses the claimed invention except for specifying that the multiplexer uses time division multiplexing or demultiplexing. Figure 1 of Liberman et al. discloses using time division multiplexing to multiplex/demultiplex low speed data into/from high-speed data. It would have been an obvious matter of design choice to one of ordinary skill in the art at the time the invention was made to use time division multiplexing or demultiplexing in the system taught by the references as applied to claim 1 above since time division multiplexing/demultiplexing is a simple multiplexing scheme that does not require complicated circuitry.

68. Assuming that claims 38-41 should be consistent with Figure 7 and the corresponding description, claims 38-41 are also rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above and further in view of Sistanizadeh et al. (US Patent No. 5,784,683). The references as applied to claim 1 above discloses the claimed invention except for frequency division multiplexing or demultiplexing a plurality of low frequency telephony lines with or from a plurality of low speed data streams wherein the means for multiplexing or demultiplexing comprises one or more splitters. Sistanizadeh et al. discloses frequency division multiplexing or demultiplexing a plurality of low frequency telephony lines with or from a plurality of low

speed data streams wherein the means for multiplexing or demultiplexing comprises one or more splitters. (See Figure 8; column 21, line 46 – column 22, line 57; and claim 6) It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the frequency division multiplexing or demultiplexing to the system disclosed by the references as applied to claim 1 above in order to provide greater flexibility by enabling the transmission of additional low rate data with the high speed data stream.

69. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. in view of Helms et al. as applied to claim 1 above, and further in view of Giorgio (US Patent No. 4,862,456). Since it is well-known that a central office in a telephone network provides the switching and power for subscribers (for example, see Giorgio, column 1, lines 38-45), it is inherent that Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention.

70. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. in view of Helms et al. as applied to claim 1 above, and further in view of Gavrilovich (US Patent No. 4,685,129). Since it is well known that the central office normally provides electrical power to the subscriber (for example, see Gavrilovich, column 1, lines 12-24), it is implicit that the central office (24) in Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention.

71. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above and further in view of O'Connor et al. The references as applied to claim 1 above discloses the claimed invention except for means for assigning data rates to modem elements in accordance with the quality of the line corresponding thereto. O'Connor et al. discloses that data rates over telephone transmission lines are related to the quality of the transmission line. (See column 1, lines 15-32) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a means for assigning data rates to modem elements in accordance with the quality of the line corresponding thereto in the system taught by the references as applied to claim 1 above in order to maximize the data throughout for a given set of lines and line conditions. (See O'Connor et al., column 1, lines 28-32)

72. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above and further in view Terry and Jones et al. The references as applied to claim 1 above discloses the claimed invention except for means for measuring line isolation comprised of the three means recited in claim 46, lines 2-8.

Terry discloses a circuit comprised of a means for measuring the noise level while a modem is not transmitting a signal in order to determine the level of crosstalk (and hence, the level of isolation) between transmission lines. (See column 6, lines 10-59) It is implicit that the modems are on. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the means disclosed by

Terry in the system taught by the references as applied to claim 1 in order to optimize system performance by minimizing NEXT interference during transmissions.

Furthermore, since Jones et al. discloses allocating teaches allocating signals to twisted pairs in binders based on performance criterion or line quality parameters, (see abstract; Figures 2 and 6; column 3, lines 41-51; column 4, line 58 – column 2, line 2; column 6, line 60 – column 7; and column 9, line 60 – column 11, line 8), it would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate the data streams to particular lines in order to further improve the overall performance of the system. It also would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate more isolated lines to more sensitive signals in order reduce the amount of interference with more sensitive signals. This reduces the amount of corruption to increase the probability of data recovery and reduce the amount of necessary error correction.

73. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above and further in view Mann et al. (US Patent No. 5,251,210). The references as applied to claim 1 above discloses the claimed invention except for a means for generating a spatial frame comprising a header and data words.

Mann et al. teaches using a means for generating a spatial frame comprising a header and data words in a device which divides a high speed data stream into multiple lower speed data streams. (See the abstract; Figures 1 and 5; column 1, line 53 – column 2, line 29; column 6, lines 35-63; and column 7, line 5 – column 8, line 58) It

would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the means disclosed by Mann et al. into a system disclosed by the references as applied to claim 1 above in order to accurately recover the high speed data stream.

74. Claims 59-63 and 101-105 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 in view of Helms et al.

75. With regard to claims 59-63 and 101-102, Locklear, Jr. et al. discloses the claimed invention except for encoding the high speed data stream prior to dividing the stream into shorter data segments, interleaving and then de-interleaving the high speed data stream or scrambling/de-scrambling the high speed data stream.

Helms et al. teaches encoding a high speed data stream using Reed-Solomon encoding and decoding, interleaving and then de-interleaving the high speed data stream or scrambling/de-scrambling the high speed data stream. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements into the method disclosed by Locklear, Jr. et al. in order to provide a more secure transmission.

76. With regard to claims 103, since it is well-known in the art that FEC or Reed-Solomon coding generates codewords of length K wherein the codeword consists of a payload portion containing K-R bytes and a redundancy portion consisting of R bytes, it

is inherent that Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention.

77. With regard to claim 104, Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention including an encoder which generates codewords wherein each codeword consists of a payload portion containing K-R bytes and a redundancy portion consisting of R bytes. Although Betts in view of Helms et al. does not disclose the basis for how K and R are chosen, it would be an obvious matter of design to choose K and R based on the system in which forward error correction is implemented and the desired amount of error correction.

With regard to claims 105, Locklear, Jr. et al. in view of Helms et al. discloses the claimed invention except for the basis for selecting the parameters for the codewords. It would be an obvious matter of design to choose K and R based on the system in which forward error correction is implemented and the desired amount of error correction.

78. Claims 70, 76, 115 and 116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above.

79. With regard to claim 70, Locklear, Jr. et al. discloses the claimed invention except specifying using a plurality of Discrete Multitone modem elements. Since it is well-known in the art to use DMT technology to transmit data over telephone lines, it would have been an obvious matter of design choice to use DMT modems based on factors such as the type of application, desired performance, or cost and availability of a particular modem technology.

80. With regard to claims 76, 115 and 116, Locklear, Jr. et al. discloses the claimed invention except for an interface to one of the recited services. It would have been an obvious matter of design choice to adapt the service channel module to a particular service based on the network in which the device is implemented.

81. Claims 78-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear Jr. et al. as applied to claim 58 above, and further in view of McGhee et al. Locklear Jr. et al. discloses the claimed invention except taking periodic measurements of one or more twisted pair line parameters at various frequencies.

McGhee et al. discloses monitoring crosstalk between twisted wire pairs at various frequencies. (See abstract; column 1, line 59 – column 2, line 6; and column 2, lines 22-30) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the method disclosed by McGhee et al. into the method taught by Locklear Jr. et al. in order to adjust the transmission rate based on the detected crosstalk thereby increasing the efficiency of the data transfer.

82. Claim 80 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear Jr. et al. in view of McGhee et al., as applied to claim 78 above, and further in view of Terry. Locklear Jr. et al. in view of McGhee et al. disclose the claimed invention except for monitoring near-end crosstalk as the line parameter. Since Terry discloses that near-end crosstalk is also a source of interference for twisted-pair telephone lines (see column 1, lines 31-49), it would have been obvious to one of ordinary skill in the art at

the time the invention was made to monitor near-end crosstalk to compensate for known possible sources of noise and interference thereby improving the transmission rate and accuracy of data recovery.

83. Claims 81-83, 87-90 and 117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear Jr. et al. as applied to claim 58 above, and further in view of Jones et al. Locklear Jr. et al. discloses the claimed invention except for allocating data streams to twisted pairs within a binder as recited in the respective claims.

Jones et al. teaches allocating signals to twisted pairs in binders based on performance criterion or line quality parameters. (See abstract; Figures 2 and 6; column 3, lines 41-51; column 4, line 58 – column 2, line 2; column 6, line 60 – column 7; and column 9, line 60 – column 11, line 8) It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method disclosed by Jones et al. with the method disclosed by Locklear Jr. et al. in order to improve the overall performance of the system. It is implicit that there is a step for spatial mapping the internal structure of a cable and binder unit in order to be able to allocate signals.

84. Claim 84 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear Jr. et al. as applied to claim 58 above and further in view of Lancon et al. Locklear Jr. et al. discloses the claimed invention except for excluding a particular twisted pair line from

the plurality of twisted pair lines used for transmission of the high speed data stream in the event the quality of the particular twisted pair line drops below a threshold.

Lancon et al. teaches discontinuing the use of a transmission line if the quality of the line is unacceptable. (See column 12, lines 13-46) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the teaching of Lancon et al. into the method disclosed by Locklear Jr. et al. in order to avoid losing data and improve data reliability.

85. Claim 85 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of O'Connor et al. and Chen. Locklear, Jr. et al. discloses the claimed invention except for measuring a plurality of cable parameters including near end crosstalk and means for canceling the near end crosstalk.

O'Connor et al. discloses measuring and monitoring line quality (i.e. cable parameters). (See column 1, lines 15-32) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the steps of measuring and monitoring line quality in the method disclosed by Locklear, Jr. et al. in order to maximize the data throughout for a given set of lines and line conditions. (See O'Connor et al., column 1, lines 28-32) Although O'Connor et al. does not disclose measuring near end crosstalk, it would have been obvious to one of ordinary skill in the art at the time the invention was made to also measure near end crosstalk since near end crosstalk affects the quality, and hence, the rate of the data transmission.

Chen discloses canceling near end crosstalk from a received data stream. (See Figures 14a-14e and column 40, line 65 – column 42, line 16) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the teachings O'Connor and Chen in the method taught by Locklear, Jr. et al. in order to more reliably transmit and receive data by anticipating causes of signal degradation and providing compensation or corrections due to these sources of signal degradation.

86. Claim 86 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of Chen. Locklear, Jr. et al. discloses the claimed invention except for the recited NEXT cancellation steps. Chen discloses the recited NEXT cancellation steps. (See Figures 14a-14e and column 40, line 65 – column 42, line 16) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the NEXT cancellation steps disclosed by Chen into the method taught by Locklear, Jr. et al. in order to avoid data degradation and enable accurate data recovery.

87. Claims 92 and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of Liberman et al. Locklear, Jr. et al. discloses the claimed invention except for multiplexing or demultiplexing using time division multiplexing or demultiplexing. Figure 1 of Liberman et al. discloses using time division multiplexing to multiplex/demultiplex low speed data into/from high-speed data. Since Locklear, Jr. et al. teaches that any suitable technique

could be used (see Locklear, Jr. et al., column 4, lines 16-18), it would have been an obvious matter of design choice to one of ordinary skill in the art at the time the invention was made use time division multiplexing or demultiplexing since time division multiplexing/demultiplexing is a simple multiplexing scheme that does not require complicated circuitry.

88. Claim 96 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of Giorgio. Since it is well-known that a central office in a telephone network provides the switching and power for subscribers (for example, see Giorgio, column 1, lines 38-45), it is implicit that Locklear, Jr. et al. discloses the claimed invention.

89. Claim 97 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of Gavrilovich. Since it is well known that the central office normally provides electrical power to the subscriber (for example, see Gavrilovich, column 1, lines 12-24), it is inherent that the central office (24) in Locklear, Jr. et al. discloses the claimed invention.

90. Claim 98 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of O'Connor et al. Locklear, Jr. et al. discloses the claimed invention except for assigning data rates to modem elements in accordance with the quality of the line corresponding thereto.

O'Connor et al. discloses that data rates over telephone transmission lines are related to the quality of the transmission line. (See column 1, lines 15-32) It would have been obvious to one of ordinary skill in the art at the time the invention was made to assign data rates to modem elements in accordance with the quality of the line corresponding thereto in the method taught by Locklear, Jr. et al. in order to maximize the data throughout for a given set of lines and line conditions. (See O'Connor et al., column 1, lines 28-32)

91. Claim 99 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above and further in view Terry and Jones et al. Locklear, Jr. et al. discloses the claimed invention except for the steps of turning n, measuring and allocating, as recited in claim 99, lines 2-6.

Terry discloses measuring the noise level while a modem is not transmitting a signal in order to determine the level of crosstalk (and hence, the level of isolation) between transmission lines. (See column 6, lines 59) It is implicit that the modems are on. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the means disclosed by Terry in the system taught by Locklear, Jr. et al. in order to optimize system performance by minimizing NEXT interference during transmissions.

Furthermore, since Jones et al. discloses allocating teaches allocating signals to twisted pairs in binders based on performance criterion or line quality parameters, (see abstract; Figures 2 and 6; column 3, lines 41-51; column 4, line 58 – column 2, line 2;

column 6, line 60 – column 7; and column 9, line 60 – column 11, line 8), it would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate the data streams to particular lines in order to further improve the overall performance of the system. It also would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate more isolated lines to more sensitive signals in order reduce the amount of interference with more sensitive signals. This reduces the amount of corruption to increase the probability of data recovery and reduce the amount of necessary error correction.

92. Claims 58 and 107 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seidel in view of Locklear, Jr. et al. Seidel discloses the claimed invention including dividing a high speed data stream into a plurality of low rate data streams, transmitting the plurality of low rate data streams over twisted pair lines, and receiving and assembling a plurality of low rate data streams. (See Figures 1 and 3; column 1, lines 40-60; and column 2, lines 18-28) Although Seidel does not explicitly disclose providing a plurality of modems, it is inherent that there are modems for transmitting the signals over the lower speed data signals over the telephone lines. However, Seidel does not teach adapting the data rate of each modem in accordance with the quality of the associated twisted pair line.

93. Locklear, Jr. et al. teaches dynamically adjusting the data rate of modems based on line quality. (See column 8, lines 61-63) It would have been obvious to one of

ordinary skill in the art at the time the invention was made to dynamically adjust the data rate of the modems in Seidel in order to optimize system performance.

94. Claim 111 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above and further in view Mann et al. Locklear, Jr. et al. discloses the claimed invention except for the step of transmitting a spatial frame synchronization word.

Mann et al. teaches generating a spatial frame synchronization word in a device which divides a high speed data stream into multiple lower speed data streams. (See column 6, lines 35-63 and column 7, line 52 - column 8, line 58) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the step disclosed by Mann et al. into the method disclosed by the Locklear, Jr. et al. in order to accurately recover the high speed data stream.

95. Claims 118, 120 and 123-125 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. in view of Lepitre et al. (US Patent No. 5,524,122), Betts et al. (US Patent No. 5,475,711) and Lancon et al.

96. With regards to claims 118, 120 and 124, Locklear, Jr. et al. discloses an apparatus for transporting a high speed data stream over a plurality of modem elements wherein the apparatus includes the step of monitoring and measuring channel parameters and modifying the data rates of the modem elements accordingly. However, Locklear, Jr. et al. does not teach the steps recited in claim 118, lines 6-11.

Lepitre et al. teaches setting an initial transmission rate, estimating the maximum data rate of a modem and then setting the modem element to operate at an optimal data rate based on line quality. (See the abstract) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement teachings of Lepitre et al. into the method disclosed by Locklear, Jr. et al. in order to optimize system performance.

Since Betts et al. teaches setting an initial transmission rate at a low reliable data rate while the optimal rate parameters are being determined (see column 8, lines 18-22) and the lowest data rate of each modem is known, it would have been obvious to one of ordinary skill in the art at the time the invention was made to initially use the lowest data rate of each modem in the method disclosed by Locklear, Jr. et al. in view of Lepitre et al. in order to ensure immediate and reliable data transmission upon start-up of the system.

Because lost synchronization and other conditions affect the reliability of the data transmission (see Lancon et al., column 12, lines 12-46), it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the data rates of any modem elements affected by these conditions to minimize the effect of these conditions on the overall data transmission. For example, if an affected modem were transmitting at a high data rate, changing it to a lower data rate would reduce the amount of data that is corrupted.

97. With regard to claim 121, the references disclose the claimed invention except for the step of calculating a Near End Crosstalk transfer function. Since near-end

crosstalk affects the line quality, it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate the crosstalk for all or some of the twisted pairs.

98. With regards to claims 123 and 125, the references disclose the claimed invention except for determining a maximum transmit power and gain or determining a maximum effective data payload rate. Since the data rate of a modem is affected by various factors such as maximum transmit power and gain and maximum effective data payload rate, it would have been obvious to one of ordinary skill in the art at the time the invention was made to consider these factors in order to optimize the data rate for a set of given conditions.

99. Claims 119 and 126 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al., Lepitre et al., Betts et al., and Lancon et al. as applied to claim 118 above and further in view of Helms et al. and Jasper et al. (US Patent No. 5,533,004) The cited references disclose the claimed invention except for including Forward Error Correction tables and configuring them in accordance with the data rates of each modem. Assuming that the dispatcher divides the high speed data stream into a plurality of low rate data streams, it is implicit that the data dispatcher must configured in accordance with the data rate of each modem element in order to provide the appropriate amount of data to the modem elements.

Helms et al. discloses performing forward error correction encoding of a high speed data stream. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and

column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements into the method disclosed the references as applied to claim 127 in order to provide a more secure transmission.

Jasper et al. teaches using different forward error correction rates based on different modem data rates. (See Figure 4) It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Jasper et al. with the method disclosed by the references applied to claim 127 and Helms et al. in order to provide greater flexibility for optimizing data throughput while adjusting to changes in channel conditions.

100. Claims 127 and 129 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. as applied to claim 58 above, and further in view of Lepitre et al., Betts et al., and Lancon et al. Locklear, Jr. et al. discloses the claimed invention including monitoring and measuring channel parameters and modifying the data rates of the modem elements accordingly. However, Locklear, Jr. et al. does not teach the steps recited in claim 127, lines 3-8.

Lepitre et al. teaches setting an initial transmission rate, estimating the maximum data rate of a modem and then setting the modem element to operate at an optimal data rate based on line quality. (See the abstract) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement teachings of

Lepitre et al. into the method disclosed by Locklear, Jr. et al. in order to optimize system performance.

Since Betts et al. teaches setting an initial transmission rate at a low reliable data rate while the optimal rate parameters are being determined (see column 8, lines 18-22) and the lowest data rate of each modem is known, it would have been obvious to one of ordinary skill in the art at the time the invention was made to initially use the lowest data rate of each modem in the method disclosed by Locklear, Jr. et al. in view of Lepitre et al. in order to ensure immediate and reliable data transmission upon start-up of the system.

Because lost synchronization and other conditions affect the reliability of the data transmission (see Lancon et al., column 12, lines 12-46), it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the data rates of any modem elements affected by these conditions to minimize the effect of these conditions on the overall data transmission. For example, if an affected modem was transmitting at a high data rate, changing it to a lower data rate would reduce the amount of data that is corrupted.

101. Claims 128 is rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al., Lepitre et al., Betts et al., and Lancon et al. as applied to claim 127 above and further in view of Helms et al. and Jasper et al. The cited references disclose the claimed invention except for including Forward Error Correction tables and configuring them in accordance with the data rates of each modem. Assuming that the

dispatcher divides the high speed data stream into a plurality of low rate data streams, it is implicit that the data dispatcher must configured in accordance with the data rate of each modem element in order to provide the appropriate amount of data to the modem elements.

Helms et al. discloses performing forward error correction encoding of a high speed data stream. (See Helms et al., Figures 2A, 2B and 3; column 2, lines 34-39 and column 2, line 64 – column 3, line 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the respective elements into the method disclosed the references as applied to claim 127 in order to provide a more secure transmission.

Jasper et al. teaches using different forward error correction rates based on different modem data rates. (See Figure 4) It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Jasper et al. with the method disclosed by the references applied to claim 127 and Helms et al. in order to provide greater flexibility for optimizing data throughput while adjusting to changes in channel conditions.

102. Claims 135-138 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. in view Terry and Jones et al.

103. With regard to claim 135, Locklear, Jr. et al. discloses an apparatus for transporting a high speed data stream over a plurality of modem elements. However, Locklear, Jr. et al. does not teach the recited method of measuring pair isolation.

Terry discloses a method comprised of measuring the noise level while a modem is not transmitting a signal in order to determine the level of crosstalk (and hence, the level of isolation) between transmission lines. (See column 6, lines 10-59) It is implicit that the modems are on. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the means disclosed by Terry in the system taught Locklear, Jr. et al. in order to optimize system performance by minimizing NEXT interference during transmissions.

Furthermore, since Jones et al. discloses allocating teaches allocating signals to twisted pairs in binders based on performance criterion or line quality parameters, (see abstract; Figures 2 and 6; column 3, lines 41-51; column 4, line 58 – column 2, line 2; column 6, line 60 – column 7; and column 9, line 60 – column 11, line 8), it would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate the data streams to particular lines in order to further improve the overall performance of the system. It also would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate more isolated lines to more sensitive signals in order reduce the amount of interference with more sensitive signals. This reduces the amount of corruption to increase the probability of data recovery and reduce the amount of necessary error correction.

104. With regard to claims 136 and 138, Locklear, Jr. et al. in view Terry and Jones et al. discloses the claimed invention including performing power measurements using a received signal power and power spectral density. (See Terry, column 6, lines 23-59)

105. With regard to claim 137, Locklear, Jr. et al. in view Terry and Jones discloses the claimed invention except for performing power measurements using a received signal-to-noise ratio. Since signal-to-noise ratios reflect the level of crosstalk and Terry is measuring power to determine the extent of crosstalk interference, it would have been an obvious matter of design choice to one of ordinary skill in the art at the time the invention was made to measure signal-to-noise ratios to determine the level of crosstalk in the system disclosed by Locklear, Jr. et al. in view Terry and Jones et al.

106. Claims 143-146 are rejected under 35 U.S.C. 103(a) as being unpatentable over Locklear, Jr. et al. in view Terry and Jones et al.

107. With regard to claim 135, Locklear, Jr. et al. discloses an apparatus for transporting a high speed data stream over a plurality of modem elements. However, Locklear, Jr. et al. does not teach the recited method of allocating transmit frequency bandwidth.

Terry discloses a method comprised of measuring the noise level while a modem is not transmitting a signal in order to determine the level of crosstalk (and hence, the level of isolation) between transmission lines. (See column 6, lines 10-59) It is implicit that the modems are on. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the means disclosed by Terry in the system taught Locklear, Jr. et al. in order to optimize system performance by minimizing NEXT interference during transmissions.

Furthermore, since Jones et al. discloses allocating teaches allocating signals to twisted pairs in binders based on performance criterion or line quality parameters, (see abstract; Figures 2 and 6; column 3, lines 41-51; column 4, line 58 – column 2, line 2; column 6, line 60 – column 7; and column 9, line 60 – column 11, line 8), it would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate the data streams to particular lines in order to further improve the overall performance of the system. Since more broadband transmissions involves the transmission of more data, it also would have been obvious to one of ordinary skill in the art at the time the invention was made to allocate more isolated lines to more broadband signals in order minimize the interference to more of the data. Reducing the interference reduces the potential for corruption of the transmitted data which increases the probability of accurate data recovery and reduces the amount of necessary error correction.

108. With regard to claims 144 and 146, Locklear, Jr. et al. in view Terry and Jones et al. discloses the claimed invention including performing power measurements using a received signal power and power spectral density. (See Terry, column 6, lines 23-59)

109. With regard to claim 145, Locklear, Jr. et al. in view Terry and Jones discloses the claimed invention except for performing power measurements using a received signal-to-noise ratio. Since signal-to-noise ratios reflect the level of crosstalk and Terry is measuring power to determine the extent of crosstalk interference, it would have been an obvious matter of design choice to one of ordinary skill in the art at the time the

invention was made to measure signal-to-noise ratios to determine the level of crosstalk in the system disclosed by Locklear, Jr. et al. in view Terry and Jones et al.

Allowable Subject Matter

110. Claim 52 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

111. Claim 106 is allowable.

Conclusion

112. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Betsy L. Deppe whose telephone number is (703) 305-4960. The examiner can normally be reached on Monday, Tuesday and Thursday (8:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (703) 305-4714.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9306

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Betsy L. Deppe
Primary Examiner
Art Unit 2634
January 9, 2004